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PHYTOCHEMICAL SCREENING OF THE LEAF EXTRACTS OF FEW SELECTED PLANTS OF ULHASNAGAR

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ABSTRACT

Phytochemical screening of the leaves of five plants from Smt. C.H. M. College campus, Ulhasnagar was carried out. Among the plants studied except *Nyctanthus arbor-tristis* L. and *Muntingia calabura L.*, the remaining plants *viz. Lantana camara L., Synedrella nodiflora L. (Gaertn.), Hyptis suaveolens* L. (Point.*), Mirabilis jalapa* L. were permanent weeds of the campus. Weeds are the plants growing in an unwanted area. There is a wide weed biodiversity in and around Ulhasnagar. These weeds are neglected by the urban population but many rural people know the importance of these plants. The medicinal importance of these weeds is due to the secondary metabolites present in the plant parts. Hence preliminary phytochemical screening of few of these plants was carried out in aqueous and other solvent extracts. The results revealed the presence of alkaloids, steroids, tannins, flavanoids, phenolics, saponins and terpenoids in various solvent extracts studied. The presence of various phytochemicals supports their ethno-medicinal uses.

KEYWORDS: Secondary Metabolites, Alkaloids, Saponins, Flavanoids, Terpenoids, Tannins, Steroids, Phenolics

INTRODUCTION

Plant has been a source of medical agents for thousands of years and a good number of modern

Drugs have been isolated from natural sources; which are used in the traditional medicine. This plant-based, traditional medicine system continues to play an essential role in health care, with about 80% of the worlds inhabitants relying mainly on traditional medicines for their primary health care (Mary Kenza, 2011). According to WHO, medicinal plants would be the best source to obtain a variety of drugs. Therefore such plants should be investigated to understand their properties, safety and efficacy. Approximately 20% of the plants in the world have been submitted to pharmacological or biological test and a substantial number of few antibiotics introduced to the market are obtained from natural or semisynthetic resources. Over 50% of all modern clinical drugs are of natural origin and natural products play an important role in drug development in the pharmaceutical industry (Mary Kenza, 2011). Plants are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids which have been found to have in vitro antimicrobial properties (Edeoga et al. 2005). The medicinal value of these plants lies in some chemical substances that provide definite physiological action on the human body. Undoubtedly,

Medicinal plants are relevant in both developing countries and developed nations of the world as Sources of drugs or herbal extracts for various chemotherapeutic purposes (*Alanis et al. 2005).*

A weed is an unintended growth of any plant in an area where it is not wanted. It may become a nuisance in any manner. Any plant can become weed depending upon where it grows and how it affects the human population. eg. Corn is an important commercial crop but it becomes a weed in a garden. A tree can become a weed if it is invasive and suppresses

the growth of other crops. (Ferguson and Rathinasabapathi, 2003). These herbs are local heritage of global importance. Medicinal herbs have curative properties due to presence of various complex chemical substances of different compounds which are found as secondary plant metabolites in one or more parts of these plants. These compounds can be alkaloids, tannins, volatile oils, glycosides, etc. (Patil *et al.* 2009). These secondary metabolites play diverse roles in plants such as protection from grazing animals, pathogenic organisms, attracting or repelling insects, etc. These compounds are stored in specific plant parts such as root, stem, bark, leaf, flower, seed, etc. (Vaidya, 2006). Plant foods contain constituents such as flavonoids, saponins, tannins, phenolics, etc. which have been assessed for their anti-oxidant, anti-mutagenic, anticarcinogenic and other biological effects (Krishnaswamy and Raghuramulu, 1998). Interestingly, natural product research guided by ethno-pharmacological knowledge has made substantial contributions to drug innovation by providing novel chemical structures or mechanisms of action (De Smet, 1997). According to a report by Walker (1975), the medicinal properties of plants could be seen in their response to attacks from insect predators and disease organisms. This is achieved by the accumulation of phytochemicals at the sites of infection of plants, several of which are insecticidal, anti-bacterial, antifungal, etc. (Walker, 1975; Ameen *et al*. 2005). Hence it is essential to screen these plant parts for the presence of these substances. Plant extract or plant derived antioxidant compounds improve human body's antioxidant defense and are preferable because of their safety over synthetic. Therefore, a large scale of research is based on discovering plants that protect against various kinds of ailments with antioxidant potential that may be used for human consumption.

The medicines used today are creating many problems such as allergy, side effects, etc. Since the pathogens are evolving with multidrug resistant properties, the medicines used today are becoming less and less effective. So there is an urgent need to develop new and safer drugs. Many of the researchers are diverting their attention to the folk medicines. With the same aim the present project was undertaken to conduct the preliminary phytochemical screening of leaves of *Lantana camara* L., *Synedrella nodiflora* L. (Gaertn.), *Muntingia calabura* L., *Hyptis suaveolens* L. (Point.), *Mirabilis jalapa* L. and *Nyctanthus arbor-tristis* L. in distilled water and various solvents extracts such as petroleum ether, chloroform, ethyl acetate, benzene, methanol.

MATERIALS AND METHODS

The material used was the leaves of Lantana *camara* L., *Synedrella nodiflora* L. (Gaertn.), *Muntingia* calabura L., *Hyptis suaveolens* L. (Point.), Mirabilis *jalapa* L. and *Nyctanthus arbor-tristis* L.

- ***Lantana camara* L. Sp. Pl. 1753**

  Synonyms: Camara vulgaris, Lantana scabrida

  Vernacular name: Ghaneri

  Common name: Steeper weed, wild sage

  Family: Verbanaceae (National Plant Database, 2004)

Description

It is a woody, evergreen shrub which may grow to heights of 6 feet and spread to an area of about 8 feet. The leaves are 5-8 cm long and 3-5 cm wide. The leaves are rough and coriaceous with serrate to dentate margin and acute apex. Young stems and leaves are covered with trichomes having an unpleasant aromatic odour. Flowers are variously

coloured, small in umbelliferous clusters. Fruits black coloured berry.

Uses

It is a troublesome weed of roadsides, pastures, grasslands, woodlands and forests. (Review of the Declaration of Lantana Species in NSW, NSW Department of primary Industries). It produces chemicals that inhibit the germination and growth of wheat, soybean and ryegrass. (Gentle and Duggin, 1997; Swarbrick *et al*. 1998; Stock, 2004). *Lantana camara* L. is a host of many pests and other plant pathogens in and around the world. (Parsons and Cuthbertson, 2001). The leaves of *Lantana camara* L. reduce the visual amenity of various areas. (Ensbey, 2003). It is widely grown as an ornamental plant. The triploid varieties produce less number of seeds and are used in landscaping. (Swarbrick *et al*. 1998). The extracts from leaves possess antimicrobial, fungicidal, nematicidal and insecticidal activity. Twigs and stem are used as firewood. Essential oil from flowers is used in perfumery. (Munir, 1996; Day *et al.* 2003).

- ***Synedrella nodiflora* (L.) Gaertn**.

  Gaertner, J. (1791) De Fructibus et Seminibus Plantarum: 2:456.

  Synonym: Verbesina nodiflora L. (Cent. Pl. 1:28 (1755).

  Common Name: Cinderella weed/ Cindrella weed.

  Family: Asteraceae.

Description

It is a small, ephemeral herb with the height of about 1-1.5 feet and about the same width. The leaves are thin, 6-10 x 3-6 cm in size with a few dentations on the margin, acute apex, smooth in touch and covered hair. Flowers are yellow with few flowered small heads. Outer florets are female, the innermost florets are male and the intermediate florets are hermaphrodites. (http://www.weeds.Synedrella_nodiflora.htm.)

Uses

The leaves and roots are used for malaria, muscular pains, gastrointestinal problems, cardiovascular problems and skin infections. (Idu and Onyibe, 2007). It possesses good antibacterial and antifungal activity. (Bhogaonkar, *et al.* 2011). (www.Cinderella/weed.html)

- ***Muntingia calabura* L.**

  Common Name: Jamaican/Japanese cherry tree, Strawberry tree.

  Vernacular Name: Panchara

  Family: Eleocarpaceae.

Description

It is a fast growing evergreen tree reaching 25-40 feet in height. The branches are nearly horizontal. The leaves are alternate, oblong to lanceolate with a pointed apex and an oblique base. The leaves are 5-12.5 cm long, 4-6.5 cm wide, dark green, minutely hairy on the upper side, gray-brown hairy on the lower side and dentate margin. The flowers are in clusters of 2-3 in the leaf axils and are about 2 cm wide. Each flower is regular, with green sepals, 5 white petals and many

Prominent stamens. The fruits are 2-4 cm long rounded, with thin outer covering and pulpy. (http://www.naturia.per.sg) (www.weeds.ecology.asp.htm)

Uses

Fruits are edible. Timber is compact, fine grained, and moderately strong. It is used in carpentry, as firewood and in paper making. Bark is used in rope making. The flowers are used as antiseptic, to relieve headaches and cold. (http://www.globinmed.com)

- ***Hyptis suaveolens* (L.) Poit.**

  Common Name: Pignut, American Mint, Bush Mint, Chan.

  Synonym: Ballota suaveolens L.

  Vernacular Name: Darp Tulas, Jungali Tulas.

  Family: Lamiaceae

Description

An aggressive, rigid, annual herb that attains a height of 2.5 meters in a growing season. The stem is square and covered with hairs. The leaves are ovate to obovate, 3-5 cm long and 2-4 cm wide with serrulate margins and a 3 cm long petiole. Lower surface of the leaves is covered with hairs. Flowers blue in small verticillasters. Calyx 5 mm but becomes 10 mm in fruit. Corolla bilabiate; stamen 4, didynamous. (Raizada, 2006).

Uses

Drink from seeds is used as a refreshing healthy drink. Plant is used in treatment of diarrhea. The leaves are insecticidal and are used in the storage of grains. (www.wikipedia.com).

- ***Mirabilis jalapa* L. (Sp. Pl. 1753, P. 177).**

  Common Name: 4 o'clock plant, Beauty of the night

  Synonym: Mirabilis jalapa Subsp. lindmeri Standl., Mirabilis lindmeri (Standl) Shinners.

  Vernacular Name: Gulbakshi

  Family: Nyctaginaceae (http://www.vplants.org/Plants/species/species.jsp?gid=26119)

Description

It is an annual or perennial herb of about 0.5-2.0 meters height. Roots are swollen and slightly tuberous. The stem bears several decumbent branches very much near the base. The leaves are opposite with about 1-7 cm long petioles, elongated triangular to lanceolate, 4-14 cm long and 2-9 cm in width. Margin of the leaves is smooth and the apex is acute. Flowers are in compact clusters of 5-15, subtended in two bracts, pink, yellow or white, 3-5 cm long and with funnel shaped corolla. Stamen 5 long, ovary one globular, single chambered. Style slender and stigma capitate.

Uses

The rot is aphrodisiac, diuretic, and purgative; used in the treatment of dropsy. Paste of root is applied as poultice

in muscular swellings. The leaves are diuretic and reduce inflammation. Leaf juice is applied in wounds. Powdered seed is used in cosmetics. (www.pfaf. org/ user/plant/asp)

- ***Nyctanthus arbor-tristis* L.**

  Common Name: Night Jasmine, Lady of the Night, Coral Jasmine.

  Synonym: Bruschia macrocarpa Bertol.; N. arbor-tristis var. dentata Hort. Ex. Moldenke;

  N. dentata Blume; N. tristis Salisb.; Parilum arbor-tristis Gaertn.; Scabrita triflora L.

  Vernacular Name: Shephali, Shephalika, Prajakta, Parijat, Parijatak.

  Family: Oleaceae

Description

It is a small tree with rough and 4-angled branches. The leaves are opposite, ovate, entire with distinct teeth. The flowers are small fragrant, sessile in small cymes and with bracts. Corolla is cylindrical tube orange with white, spreading, imbricate upper part. Anthers two at the throat of corolla tube. Ovary two celled with one ovule in each. Stigma bifid. The fruit is round brown flat capsule with seed. (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19643)

Uses

Leaves are used as antipyretic, antioxidant, laxative, and in polishing wood. A saffron-yellow dye is obtained from the corolla tube. Bark is used in tannin industry. The fragrance is extracted from flowers.

(http://www.globinmed.com/index.php?option=com_content&view=article&id=85592:nyctanthes-arbor-tristis&catid=199&Itemid=139)

METHODS

Plants were collected from campus of Smt. C.H. M. College, Ulhasnagar and brought to laboratory in polythene bags. The leaves were separated, washed, dried and powdered. Qualitative tests were carried out with various solvent extracts such as petroleum ether, chloroform, ethyl acetate, benzene, methanol and distilled water. In *Mirabilis jalapa* L. test was performed in all solvent extracts except ethyl acetate. The phytochemical constituents studied were alkaloids, steroids, flavanoids, tannins, terpenoids, saponins and phenolics, following the method prescribed by Gokhale & Kokate (2007).

RESULTS AND DISCUSSIONS

Table 1: Phytochemical Analysis of Mirabilis *Jalapa* L. and *Nyctanthus arbor-tristis* L. *Synedrella nodiflora* L. (Gaertn.) on Different Solvent Extracts

Phytochemical Parameters	*Mirabilis jalapa* L.					*Nyctanthus arbor-tristis* L.					*Synedrella nodiflora* L. (Gaertn.)				
	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol
Alkaloids	+	+	+	+	+	+	-	+	-	+	+	+	-	+	+
Steroids	+	-	-	-	-	+	+	+	-	-	-	+	-	+	-
Flavanoids	+	+	+	+	+	+	-	+	-	-	+	+	-	+	+
Tannins	+	+	+	-	+	+	-	+	+	+	+	+	-	+	+
Phenols	+	+				-	-	+	-	-	-	-	-	-	+
Terpenoids	+	+	+	+	+	+	+	-	-	+	-	+	+	+	-
Saponins	+	+	-	-	+	+	+	+	+	+		+	+	+	+

Table 2: Phytochemical Analysis of Hyptis *suaveolens* L. (Point.), Lantana *Camara* L., Muntingia *calabura* L., on Different Solvent Extracts

Phytochemical Parameters	*Hyptis suaveolens* L. (Point.)					*Lantana camara* L.					*Muntingia calabura* L.				
	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol	Distilled Water	Petroleum Ether	Chloroform	Benzene	Methanol
Alkaloids	+	+	-	-	-	-	+	-	-	-	-	-	+	+	+
Steroids	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
Flavanoids	+	-	-	-	-	+	+	-	-	-	-	+	+	+	+
Tannins	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
Phenols	-	-	-	+	-	-	+	-	-	+	-	-			
Terpenoids	+	+	+	-	+	-	-	+	-	-	+	-	-	+	+
Saponins	-	-	+	+	+	-	+	+	+	+	+	-	+	-	+

***Mirabilis jalapa* L.**

In Mirabilis jalapa L., phytochemical constituents such as alkaloids, flavanoids, tannins, terpenoids were present in all the six extracts studied, while steroids were detected only in aqueous extract (Table 1). Saponins were found to be absent in chloroform and benzene extracts while tannins were reported to be absent only in benzene extract. Similar results were reported by Lakshmi Devi *et al*. (2011) and Akintobi et a.l (2011). The presence of alkaloids, saponins, tannins and terpenoids is in agreement with Ullah *et al.* (2011).

***Nyctanthes arbor-tritis* L.**

In *Nyctanthes* arbor-*tritis* L., except phenolics all phytochemical constituents were detected in aqueous extract (Table 1). While except steroids, terpenoids and saponins, rest of the phytochemical constituents were absent in petroleum ether extracts. The result of the present study is in contradiction to the study of Nirmal et al. (2012). Chloroform extract showed the presence of all the phytochemical constituents except terpenoids. Only tannins and saponins were detected in ethyl acetate extract. In benzene extract, only alkaloids, tannins, terpenoids, saponins were detected while rest of the phytoconstituents were absent in the present study. Methanol extract showed the presence of alkaloids, flavanoids and tannins. Balasubrahmanian, (2012) reported the absence of terpenoids and alkaloids and presence of tannin and saponins in ethyl acetate extracts. Similar results were obtained in the present study also. Even though steroids, flavanoids and phenolics were reported to be present by Balasubrahmanian (2012), in the present study these were reported absent. This can be due to the masking effect which often occurs when different phytochemical form a mixture. The presence of a

particular phytochemical is not noticed because it may be masked or inhibited by other phytochemical that make up the mixture.

***Synedrella nodiflora* L.**

In Synedrella nodiflora L., except phenolics all phytochemical constituents were detected in aqueous and chloroform extract. (Table 1). only terpenoids and saponins were detected in petroleum ether extract. In methanol extract, phenolics and saponins were reported to be absent. This is in contradiction to the reports of Gnanaraj and Iqbal (2012), where saponins were reported in the methanol extract. They also reported the absence of terpenoids in the methanol extract which is reported to be present in this study. Except steroids and terpenoids, all the phytoconstituents were present in ethyl acetate. The absence of steroids in the ethyle acetate extract was in agreement with Gnanaraj and Iqbal (2012), while benzene extract reported only tannins and terpenoids.

***Hyptis suaveolens* L. (Point.)**

In Hyptis saveolens, alkaloids, flavanoids, tannins and terpenoids were reported to be present in aqueous extract, while remaining phytochemicals were absent. (Table 2) Similar results were already reported by Mbatchou *et* a.l (2010). In petroleum ether extract, only alkaloids, tannins and terpenoids were detected. The results were in agreement with the reports of Mbatchou (2010). In the chloroform extract, saponins, tannins and terpenoids were detected in the present study, while flavanoids, alkaloids, steroids and phenolics were absent. But Mbatchou (2010) reported the presence of flavanoids and absence of saponins in chloroform extract which is contradictory to the results of the present study. Alkaloids and tannins were absent in ethyl acetate, benzene and methanol extracts. Ethyl acetate extract showed the presence of tannin, phenolics and saponins only, while benzene extract reported only tannins, terpenoids and saponins. Methanol extract reported the presence of only flavanoids and tannins.

***Lantana camara* L.**

Mary Kensa (2011) reported the presence of steroids and saponins in aqueous extract while in the present study, alkaloids, flavanoids, tannins, phenolics and saponins were present. (Table 2). This may be due to the altered stress conditions under which the plant is growing.The result of the present study is in agreement with the observation of Mary Kensa (2012) in petroleum ether extract where only terpenoids and saponins were reported. In the present study, chloroform extract showed the presence of only tannins and saponins, while Mary Kensa (2012) reported alkaloids, phenolics and tannins in the chloroform extract. Ethyl acetate extract in the present study showed the presence of tannins, phenolics and saponins and benzene extract reported tannins, terpenoids and saponins. Methanol extract results were in agreement with the earlier studies (Mary Kensa, 2012) where only flavanoids and tannins were reported.

***Muntingia calabura* L.**

In Muntingia calabura, the studies were conducted only on aqueous extract, chloroform and methanol extracts. (Table 2). Except terpenoids, all the other phytochemicals were present in aqueous extracts. Earlier reports by Zakaria et al. (2011) reported alkaloids and steroids to be absent in aqueous extract. The chloroform extract in the present study showed the presence of all phytochemicals except saponin which is in agreement with the results of Zakaria *et al*. (2011) except for the presence of alkaloids in the present study. Zakaria et al. (2011) reported terpenoids, steroids and alkaloids to be absent in the methanol extract which is in agreement with the results of the present study except for the presence of

terpenoids in methanol extract in the present study.

CONCLUSIONS

The investigation was able to prove that the plants studied were rich in various phytochemicals. These findings justify the ethno-medicinal uses of these plants and could be of interest to pharmaceutical companies. Since many of the phytochemicals were proved to have antibacterial and antifungal activities, these plants can therefore be employed in the formulation of new chemotherapeutic agents. As these are only preliminary investigations, the authors would like to continue the *in vitro* and *in-vivo* activities of these and some more plants.

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